

What is claimed is:

1. A process for producing a self-cross-linking alkyl cellulose derivative, which comprises irradiating, with radioactive rays, a mixture of a starting alkyl cellulose derivative (the number of carbon atoms of the alkyl group is 1 to 3, the alkyl group may be substituted by a hydroxyl group or a carboxyl group, and the carboxyl group may form a salt) (100 parts by weight) and water (5-2,000 parts by weight).

2. A process for producing a self-cross-linking alkyl cellulose derivative according to claim 1, wherein the starting alkyl cellulose derivative is carboxyalkyl cellulose, hydroxyalkyl cellulose, or alkyl cellulose, having at least one hydroxyl group or carboxyl group per glucose unit; or a mixture of these celluloses.

3. A process for producing a self-cross-linking alkyl cellulose derivative according to claim 1, wherein 20% or more of the entirety of carboxyl groups of the starting alkyl cellulose derivative forms an alkali metal salt, an ammonium salt, or an amine salt.

4. A process for producing a self-cross-linking alkyl cellulose derivative according to claim 2, wherein the starting alkyl cellulose derivative has an average polymerization degree of 10-2,000 and an average etherification degree of 0.5 or more.

5. A process for producing a self-cross-linking alkyl cellulose derivative according to claim 1, wherein the self-

cross-linking alkyl cellulose derivative has a gel fraction of 0.1% or more.

6. A process for producing a self-cross-linking alkyl cellulose derivative according to claim 1, wherein the dose of radioactive rays is 0.1 kGy or more as reduced to γ -rays.

7. A process for producing a self-cross-linking alkyl cellulose derivative according to any one of claims 1 through 6, wherein the produced alkyl cellulose derivative is further subjected to a drying step.

8. A self-cross-linking alkyl cellulose derivative produced through a production process as recited in any one of claims 1 through 7.

9. A self-cross-linking alkyl cellulose derivative according to claim 8, wherein, when the dried self-cross-linking alkyl cellulose derivative (0.2 g) is added to an aqueous acetic acid solution (buffer having a pH of 4.5) (10 ml) containing 0.5 wt.% of cellulase and the resultant solution is allowed to stand at 40°C for eight hours, the percent biodegradation of the derivative is 50% or more.

10. A self-cross-linking alkyl cellulose derivative according to claim 8, wherein, when the dried self-cross-linking alkyl cellulose derivative (0.2 g) is added to an aqueous acetic acid solution (buffer having a pH of 4.5) (10 ml) containing 0.5 wt.% of cellulase and the resultant solution is allowed to stand at 40°C for eight hours, the percent biodegradation of the derivative is 70% or more.

11. A self-cross-linking alkyl cellulose derivative

according to any one of claims 8 through 10, wherein the amount of distilled water, which the self-cross-linking alkyl cellulose derivative absorbs, is 30 times or more the weight of the derivative.

12. A self-cross-linking alkyl cellulose derivative according to claim 8, 9, or 11, wherein the resultant gel has a compressive strength of 100 g/cm² or more.

13. A medical product, a cosmetic product, a sanitary product, or an agricultural water retention agent, comprising a self-cross-linking alkyl cellulose derivative as recited in any one of claims 8 through 11.

14. A chromatography carrier, an industrial material, a ground-improving agent, or a soil-improving agent, comprising a self-cross-linking alkyl cellulose derivative as recited in claim 12.